the power of coagulation in the aqueous is reduced. Hence the author suggests the advisability of doing a cataract extraction in diabetics without iridectomy in order to avoid the risk of haemorrhage into the anterior chamber. The tendency to wound infection is, in his opinion, most probably due not directly to the increased sugar content but to the diminished resistance of the tissues, *i.e.*, to a reduction in the anti-bodies which, varying as they do directly with the albumen-content in the aqueous, he would infer as probable from the reduction in the latter.

The administration of insulin reduces the sugar content in the anterior chamber in the same proportion as that in the blood, but it produces no alteration in the chlorides, calcium or CO_2: the amount of fibrinogen and fibrin ferment varied inversely to the sugar.

As regards haemorrhage, the diminution of the blood sugar by insulin effects an increase of the fibrinogen and fibrin ferment which raises the coagulative power of the aqueous and thereby prevents bleeding from the injured vessels. The action of insulin in diminishing a tendency to infection is most probably due to the increase in the anti-bodies corresponding with that of the albumen content.

The experimental and clinical results obtained with insulin lead the author to state, in conclusion, that, with appropriate diet and the use of insulin, extraction of cataract in diabetics can be performed without complications.

THOS. SNOWBALL.

BOOK NOTICES

The Development of the Human Eye. By IDA C. MANN, M.B., B.S.Lond., F.R.C.S.Eng., Assistant Surgeon, Royal London Ophthalmic (Moorfields) Hospital; Pathologist, Central London Ophthalmic Hospital; Ophthalmic Surgeon, Elizabeth Garrett Anderson Hospital. With a foreword by Sir John Herbert Parsons, C.B.E., D.Sc., M.B., F.R.C.S., F.R.S. Pp. 306, with 241 illustrations. Cambridge: University Press. Published for the *British Journal of Ophthalmology*, 1928. Price, 36s.

That it is best to commence at the beginning in order to obtain a comprehensive knowledge of the subject may seem a trite observation, but for a budding ophthalmologist to commence at the beginning of his subject and study the embryology of the eye has so far been beset with difficulties. If he has endeavoured to study it practically he has encountered the difficulty of obtaining human material in a

sufficiently fresh condition, and has had to resort to that from the lower vertebrates or birds. If he has turned to treatises on anatomy and ophthalmology he has found, as Sir John Parsons points out in his "Foreword," the embryology of the eye dealt with only superficially and lacking in detail. This monograph of Miss Mann's on "The Development of the Human Eye" will help to smooth the way for all future students of the subject.

Miss Mann has, through Professor J. Ernest Frazer, had the good fortune of having access to a most comprehensive series of well preserved human embryological specimens. From these she has made excellent drawings clearly representing the various tissues of the eye in all stages of their development. These drawings, together with a number of diagrams, reproduced in the book, amount to 241 figures. The reader has therefore placed before him as he proceeds graphic representations of the changes which are being described and discussed.

The subject is divided up under the following nine headings:— 1. The early stages of the formation of the primary optic vesicle. 2. A general outline of the development of the optic vesicle and the associated mesoderm. 3. The lens. 4. The neural ectoderm. 5. The vitreous and suspensory ligament of the lens. 6. The associated mesoderm. 7. The orbit and its contents. 8. The phylogenetic development and morphology of the human eye. 9. Synoptic comparison of ocular and general development.

At the end of each section a short description is given of some of the abnormalities met with in the development of the part which has been described.

The following quotations will serve as samples of Miss Mann's many interesting findings and conclusions:—

"The invagination and formation of the foetal cleft is an inherent property of the vesicle existing to ensure the provision of a clear path from the inner (nerve-fibre-bearing) layer of the optic cup to the brain, *viâ* the primitive epithelial papilla and the inner layer of the optic stalk."

"The cornea, lens, and vitreous retain their embryonic quality of transparency throughout life, so that one should rather speak of a process of opacification of all the other tissues than of clearing of these transparent ones during development."

"The first formed lens fibres appear to be the most transparent, which property they share with other early embryonic tissues. The later fibres become progressively less and less transparent so that in extreme old age the presence of definite opacities in the equatorial region of the cortex is so common as to be almost the rule."

"At this stage (4.5 mm.) the walls of the whole central nervous system become vascularised by the invasion of fine capillaries, which grow into them from the net of thin-walled vessels which is beginning

to cover the surface of the neural ectoderm. This vascularisation occurs on the surface of the optic vesicle as well as over the rest of the fore-brain. In the fore-brain and other parts of the central nervous system it apparently persists and the little capillaries give rise to the definitive vessels of the brain substance, but in the optic vesicle the capillaries only remain until just after the 7 mm. stage. They then disappear entirely and the developing retina is completely avascular until the appearance of the *arteria centralis retinae* at 100 mm."

"The early appearance, as distinguishable elements, of the fibres of Müller is in keeping with the general rule of development that supporting tissues are first developed so as to serve as a scaffold around which can be built later the more important and highly specialised tissue."

"Differentiation of the retina into its layers takes place by the migration of the cellular products of division of the proliferating layer towards the inner surface."

"It should be realised that this differentiation proceeds in the inverse direction to the path of the final nerve impulse, the ganglion cells and nerve fibres being the first of the adult retinal elements to appear, and the rods and cones the last. The result of this is that, at the time when the percipient elements themselves appear, the layers internal to them are complete and ready to function as conductors immediately."

The internal limiting membrane of the retina is formed from the foot-plates of the fibres of Müller. "There is never anything to be seen in embryonic stages to warrant the assumption that a hyaloid membrane separating the vitreous from the retina exists apart from the internal limiting membrane which itself appears to be in continuity with the two." "When shrinkage occurs, as it does with great frequency in older material, the internal limiting membrane tears away from the retina and remains in continuity with the vitreous." Probably this is the explanation of why so many observers have described the vitreous as having posteriorly a limiting hyaline membrane.

"The early appearance of distinguishable ganglion cells at the same time or even a little before the growth of nerve fibres towards the optic stalk is of importance, since many observers in the past have advanced the theory that the fibres of the optic nerve were central in origin and that they grew from the brain towards the eye during development. A study of the retina at this stage serves to show beyond a doubt that they arise from the ganglion cells of the retina and extend centripetally."

"Later the fibres of Müller extend to this outer edge (of the retina) and form by the union of their outer processes a membrane resembling the internal limiting membrane but more delicate and

richly fenestrated. From the protoplasmic nature of the inner limbs of the rods and cones it is obvious that they must carry with them a covering derived from the original cell boundary (embryonic external limiting membrane) from which they are an outgrowth, and since they appear before the growth of the outer processes of the Müllerian fibres it seems equally certain that they derive no covering from the definitive external limiting membrane, but simply come to protrude through its fenestrations when these are formed later around their bases."

"It is worthy of note that while an appearance of cilia can be seen continuously on the inner wall of the optic cup, the outer wall cells very definitely lose them soon after the development of the pigment granules. One is therefore safe in drawing at least a close parallel, if not a definite derivative relation between cilia and the primitive outer limbs of the visual elements."

The percipient elements "begin to show in the central region at about the 48 mm. stage, and their appearance marks the cessation of cell division in that area."

With regard to the development of the optic nerve, we read :—

"There was no medullation at all at five months. In the 37 cm. (*circ.* seven months) foetus, medullary sheaths could be traced from the optic tract to the beginning of the optic nerve, and by term these had reached the *lamina cribrosa*. The medullation appears first as minute droplets of a lecithin-containing substance in the protoplasm of the glial cells. These droplets run together and surround the axis cylinders."

"The three periods of vitreous development may be summarised thus :—*First period*, up to 13 mm. Formation of primary vitreous from ectoderm of lens plate and optic vesicle, with secondary ingrowth and incorporation of vascular mesoderm. This stage ends with the secretion of the hyaline capsule of the lens, which prevents the lens taking any further part in vitreous production.

Second period, up to 65 mm. Formation of secondary vitreous from outgrowth from inner layer of optic cup, and from peripheral portion of existing vitreous by atrophy of *vasa hyaloidea propria*. A line of condensation appears, separating the central vascular remains of the earlier vitreous, which ceases to grow after the 40 mm. stage, from the peripheral avascular secondary vitreous. Stage of formation of Cloquet's canal and the capsula perilenticularis or anterior portion of the hyaloid membrane. This stage ends with the appearance of the ciliary region roughly between 50 and 60 mm.

Third period, from 65 mm. onwards (third to sixth month). Formation of tertiary vitreous from the neural ectoderm of ciliary region, and differentiation of this to form zonule fibres. Atrophy of the 'faisceau isthmique' of Druault and formation of the lateral condensation between secondary and zonule fibres, namely the

'lateral part of the anterior hyaloid membrane.' This stage ends when the secondary vitreous is completely marked off from the tertiary,"

"The *arteria centralis retinae* is just recognisable at 100 mm. (fourth month). At this time a small bulbous swelling appears on the trunk of the arteria hyaloidea just where it is passing through the disc. This enlarges, and from it two small buds grow out, one from its upper aspect, and the other from its lower. These are the beginnings of the upper and lower main branches of the arteria centralis retinae. Other arterial twigs arise from these and the bulb of the main artery, and ramify in the little cone-shaped mass of cells (Bergmeister's papilla) in the centre of the disc."

"It appears to be a general rule that the anterior portion of the sclera should appear first and progress farthest during embryonic life in all species. This may also be correlated with the fact that in the pathological condition of progressive myopia (of the developmental origin of which there is considerable evidence) it is the posterior part of the sclera which suffers the greatest stretching and deformity."

These extracts, chosen somewhat at random, will, it is hoped, stimulate the appetite of the readers of this Journal to have recourse to the book itself, in which we can assure them they will find ample material for the satisfaction of an appetite so stimulated.

The least satisfactory part of the book is the method which the author has adopted in connection with references to previous writers on the subject. There is a bibliography at the end in which references are arranged in chronological order from the year 1751 onwards, but it is far from complete, and curiously enough many writings by British authors are omitted. No numbers are attached to these references, so that where an author is quoted in the text it is only with considerable difficulty that the source of the quotation can be found.

It is improbable that this book, of which the numerous illustrations form such an essential feature, and which deals with a highly specialised subject, could have been produced as a commercial undertaking. It is satisfactory that the directors of the *British Journal of Ophthalmology* have been able to supply the necessary financial assistance.

Ueber Homonyme Hemianopsie. By E. BUNGE. Pp. 51, with one plate. Berlin: S. Karger, 1928. Price, 2.80 marks.

Bunge's work on homonymous hemianopia is one of the useful series of supplements issued by the *Zeitschrift f. Augenheilkunde*, under the editorship of C. Behr and J. Meller.

It begins with a brief account of the anatomy and physiology of the optic tracts as concerned in homonymous hemianopia. The

greater portion of space is devoted to an account of illustrative cases grouped under the two main headings of lesions of the tract and central lesions of the primary optic centres (supranuclear lesions). Bunge lays great stress on the importance of the hemianopic pupil reaction in the differentiation of the two groups. An interesting exception is quoted (case 27) in which the lesion was due to an occipital tumour, but in which also a hemianopic pupil reaction was observed. In this case there was extensive destruction of the occipital convolutions, and the author suggests that pressure on the pupillary tract on the right side between the corpus geniculatum laterale and the anterior corpus quadrigeminum may have accounted for the phenomenon. Appearances of compression were actually observed in the neighbourhood of the corpora quadrigemina and thalamus.

The author has some interesting comments to make on the various explanations offered to account for the sparing of the macula, and does not support Wilbrand's suggestion of a double supply. The plate gives a semi-diagramatic representation of the optic tracts with the corresponding binocular field of vision.

The Alien Menace. By LIEUT.-COL. A. H. LANE. London: King and Sons, 1928.

"The difficulties through which our country is passing are due not to one cause, but to many causes . . . And one of the greatest of these is the alien trouble." In a book of 87 pages, Lieut.-Col. Lane presents a striking picture of the material and moral harm done to England by alien immigration. He considers that aliens are responsible for our over-population, unemployment, and increase in disease.

It is the alleged increase in an eye-disease with which we are concerned, namely, trachoma. The author states that this disease has been re-imported into this country through the medium of Germans and Russians. If this is the case it is a national disaster. We have therefore enquired at three London ophthalmic hospitals and at three London general hospitals as to whether there has been any increase in trachoma in the last ten years as seen among the out-patients. The reply has been the same in all cases, that very few cases of the disease are seen now-a-days. It therefore appears that the author has failed to establish one of his theses. His other points are beyond the scope of this Journal.